

# 14-Decades Calibration in Airborne Detectors for Environmental Science (14DeCADES), Phase II

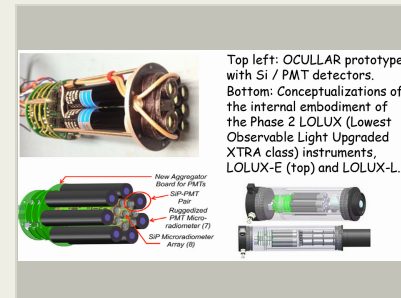
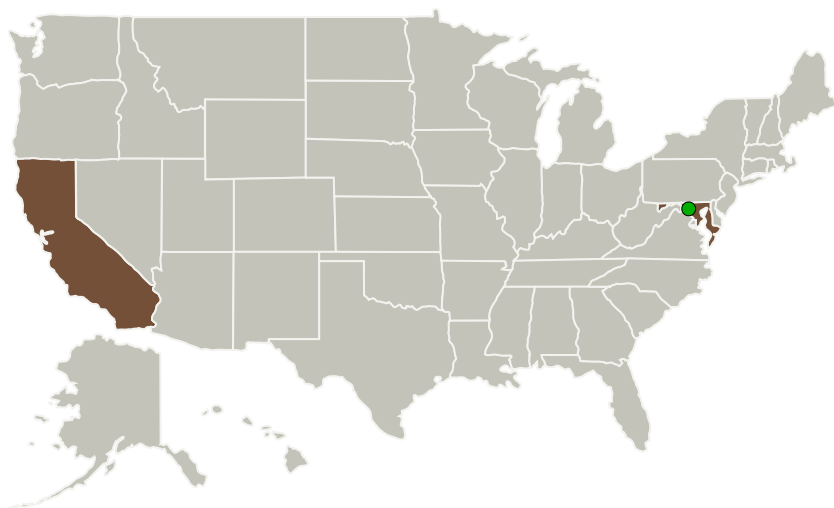
Completed Technology Project (2016 - 2018)



## Project Introduction

The 14-DeCADES SBIR leverages the results of a FY13 spontaneous IRAD and a subsequent successful Phase 1 SBIR which characterized and tested key elements that will lead to a Phase 2 SBIR to design and build a commercial-off-the-shelf (COTS) multiwaveband sensor pair (radiance and irradiance) for airborne and shipboard sensing of ocean color in conditions of very low light. The new instruments will pair ruggedized, miniature photomultiplier tubes with silicon photodetectors to create so-called hybrid dynamic detectors, featuring 14 decades of linear dynamic range. The new radiometers will be suitable for making optical measurements of the atmosphere and ocean in low-light regimes wherein high-quality optical data are rarely available. Anticipated uses include improved calibration and validation data collection for next-generation NASA satellite missions emphasizing turbid atmospheres and waters. Basic research uses include twilight and nighttime diurnal or polar winter studies (e.g. aerosol optical depth from shadow band irradiance instruments), and other moon-lit measurements including airborne ocean color missions. While Phase 1 moved the prototype from a technology readiness level (TRL) of 3, to 4, the Phase 2 effort will advance the TRL of the new technology from a value of 4 to a value of 6 over the period of the SBIR Phase 2. This technology, known as LOLUX (Lowest Observable Light Upgraded XTRA class instruments), with irradiance (LOLUX-E) and radiance (LOLUX-L) sensors, will be supported with a portable, stabilized LED-based light source to insure that the sensors exhibit the desired stability during extended deployments. Following an extensive characterization period, this technology will be demonstrated in the field and delivered to NASA.

## Primary U.S. Work Locations and Key Partners



14-Decades Calibration in Airborne Detectors for Environmental Science (14DeCADES), Phase II

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Organizations Performing Work	Role	Type	Location
Biospherical Instruments, Inc.	Lead Organization	Industry	San Diego, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

California	Maryland
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## Project Transitions

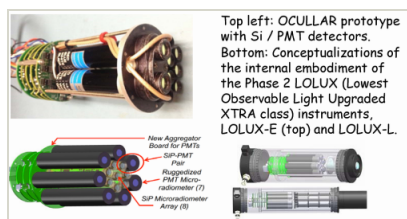
▶ **September 2016:** Project Start

✓ **December 2018:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140800>)

## Images



### Briefing Chart Image

14-Decades Calibration in Airborne Detectors for Environmental Science (14DeCADES), Phase II  
(<https://techport.nasa.gov/image/134354>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Biospherical Instruments, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

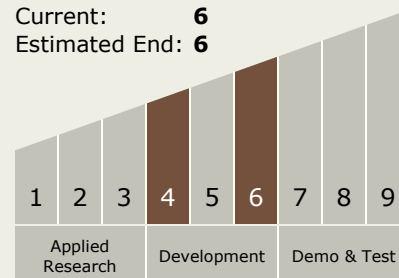
Carlos Torrez

### Co-Investigator:

John C Morrow

## Technology Maturity (TRL)

Start: **4**  
Current: **6**  
Estimated End: **6**



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## Final Summary Chart Image

14-Decades Calibration in Airborne Detectors for Environmental Science (14DeCADES), Phase II  
(<https://techport.nasa.gov/image/129650>)

## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.1 Field and Particle Detectors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System